

APPENDIX A

Submitted with Amendment filed September 26, 2006

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1: [Am J Hosp Pharm. 1975 Feb;32\(2\):177-85.](#)

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Flow rate maintenance and output of intravenous fluid administration sets.

Demoruelle JL, Harrison WL, Flora RE.

Seven brands of intravenous fluid administration sets were studied to determine: (1) which set(s) maintained the most consistent flow rates; (2) if the type of fluid container (open, vented or closed, nonvented) affected the flow rates of administration sets; and (3) which set(s) closely approximated the theoretical amounts of fluid to be delivered in one hour at flow rates of 60, 100 and 125 ml/hour. Six samples of each brand of administration set were tested in a laboratory setting which approximated clinical conditions. The type of fluid container had little effect on the performance of the administration sets. The ARDL set was the most accurate in terms of the average volume of fluid delivered in 24 hours. The Burron set required fewer adjustments in 24 hours to maintain a constant flow rate. The U.S. Surgical set recorded the smallest percent change in flow rate at the end of the first hour. The U.S. Surgical set is rated superior in overall performance. Based on the results of the study, the authors make recommendations to health care personnel, the pharmaceutical industry and the U.S. Pharmacopeial Convention.

PMID: 1136963 [PubMed - indexed for MEDLINE]

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American Journal of Hospital Pharmacy, Vol 39, Issue 3, 468-471
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Articles**Effect of intravenous fluid and drug solution coadministration on final-infusate osmolality, specific gravity, and pH****RD Leff and RJ Roberts**

The effects of I.v. fluid rates and I.v. drug delivery rates on osmolality, specific gravity, and pH of the resulting infusate were examined. Selected drug solutions of various osmolalities and 5% dextrose and 0.2% sodium chloride injection or Ringer's injection, lactated, were administered simultaneously using a drug delivery system capable of controlling the flow rates independently. The I.v. fluid and drug infusion rates were varied from 4 to 46 and from 2 to 31 ml/hr, respectively. Osmolality, pH, and specific gravity of the drug solutions and final infusate were measured. Using alligation, the osmolality, pH, and specific gravity of the final infusate were calculated; correlations between observed and calculated values were computed. Guidelines for achieving an osmolality of the final infusate less than 500 mOsm/kg water were calculated. The observed and calculated osmolality and specific gravity of the final infusate were significantly correlated ($r = 0.91$, p less than 0.001, and $r = 0.99$, p less than 0.01, respectively). The pH of the final infusate was dependent on the pH of the original drug solution and was not affected by I.v. fluid and drug delivery flow rates. Osmolality may be an important factor to consider when establishing ideal drug solution infusion rates or concentrations. The infusate osmolality can be controlled by adjusting the concentration of the drug solution, drug infusion rate, or the I.v. fluid flow rate.

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